PATENT APPLICATION BASED ON:

Docket No: 84005WFN

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FILM CENTERING DEVICE

Commissioner for Patents
Attn: Box Patent Application
Washington, DC 20231

Express Mail Label No: EV293538617US
Date: September 17, 2003

FILM CENTERING DEVICE

FIELD OF THE INVENTION

This invention relates in general to sheet handling systems and more particularly to the centering of sheets used in image reproduction apparatus.

BACKGROUND OF THE INVENTION

Image reproduction apparatus, such as electrographic, ink jet and laser printers, use media sheet such as paper or film to produce copies of images such as medical images. Typically, the media sheet needs to be correctly positioned in the apparatus with respect to the printing system. Methods for positioning the media sheet include positioning the media sheet so that one edge of the sheet is positioned against a reference surface located at one end of the printing system and positioning the sheet such that the center of the sheet comes in the center of the printing system. One technique for carrying out the latter method is to provide members on both sides of the sheet transport path to center the sheet in the apparatus. This technique is relatively complex and inefficient. A technique for carrying out the former method is disclosed in U.S. Patent 4,982,946, issued January 8, 1991, inventors Uchimura et al. As disclosed, a skew roller arranged at an angle to the transport direction of a paper sheet positions an edge of the paper sheet against a fixed reference guide running parallel to the transport direction.

There is no disclosure in this patent of applying this technique for different widths of sheet. If different widths of sheet are positioned against the fixed guide, they are edge justified and the centerline of the sheet would not pass through the centerline of the apparatus.

There is thus a need in reproduction apparatus for a simple and efficient technique for centering different size sheets in the apparatus.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a solution to these needs and problems.

According to a feature of the present invention, there is provided a sheet centering device for centering at least first and second sized sheets comprising:

a base member having a surface along which a sheet is transported along a sheet transport path;

a skew roller mounted on said base member at an angle to said sheet transport path;

a first sheet guide mounted on said base member along one side thereof;

a second sheet guide mounted on said base member parallel to but inwardly of said first sheet guide; and

a drive assembly for moving said second sheet guide between a position out of said sheet transport path when a first sized sheet is transported along said sheet transport path and a position in said sheet transport path when a second sized sheet smaller than said first sized sheet is transported along said sheet transport path.

ADVANTAGEOUS EFFECT OF THE INVENTION

The invention has the following advantages.

1. Different widths of media sheet can be positioned in reproduction apparatus such that they are transported along the centerline of the apparatus.

2. As opposed to a mechanism that uses guides on both sides of the sheet to center the sheet, the invention is relatively simple and reliable.

3. The same roller assembly is used to center the sheet and transport the sheet into the printing system transport rollers.

4. The centering of the sheet to a known position is constant.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a diagrammatic view, elevational view of a reproduction apparatus incorporating the present invention.

Fig. 2 is a top perspective view of an embodiment of the present invention, showing the small sheet guide in a down position.

Fig. 3 is a bottom perspective view of the embodiment shown in Fig. 2.

Fig. 4 is a top perspective view of the embodiment of Fig. 2 showing the small sheet guide in the up position.

Fig. 5 is a bottom perspective view of the embodiment shown in Fig. 4.

Figs. 6A and 6B are respective side elevational views respectively showing the small sheet guide in the up and down positions.

Figs. 7A, 7B and 7C are top plan views illustrating how a sheet would be moved when the small sheet guide is in the up position. Similar action would occur for the large sheet but the sheet would move along the large sheet guide instead of the small sheet guide.

DETAILED DESCRIPTION OF THE INVENTION

Referring now to Fig. 1, there will be described reproduction apparatus incorporating an embodiment of the present invention. The apparatus described is a medical image printer in which a medical image is reproduced on heat processable film. As shown, apparatus **100** includes a housing **102**, film supply and pick up module **104**, optics module **106**, film processor module **108** and output tray **110**. Module **104** receives a cartridge of unexposed film. The cartridge contains machine readable information including size of the film in the form of an optically readable bar code, or magnetic or radio frequency readable media. The read information is used to control the operation of apparatus **100** including the present invention.

A film pick-up device feeds a sheet of unexposed film from module **104** along a sheet transport path **112**. The unexposed film is transported

along path **112** from film pick up position **114** to transport rollers **116** at position **118**, where it enters the sheet centering device **120** of the present invention. Device **120** includes skew roller **122** at position **124** at which the film is positioned by skew roller **122** against a film guide. The centered film is transported to imaging position **126** including rollers **5** and **6** where the film is exposed to a medical image by optics module **106**. The film is transported past positions **132**, **134** by transport rollers **136**, **138** respectively to image processor **108**, at position **139**. Processor **108** heat processes the exposed film to produce a developed medical image on the film. The film is transported along path **112** out of processor **108** to output tray **110**.

Referring now to Figs. 2-7C there will be described an embodiment of the film centering device of the present invention. As shown, device **120** includes skew roller **122** mounted at an angle to film direction **32** on member **34** by brackets **36**, **38**. Roller **122** is driven by skew roller drive motor assembly **3**. Skew roller **122** could also be driven by a linkage between it and drive assembly **4.** Device **120** includes large film guide **2** fixedly mounted on base plate **34** and small film guide **9** mounted on member **34** for movement into and out of the film path. Further shown are pinch rollers **5** forming an imaging nip with roller **6** and driven by drive motor assembly **4**. Small film guide **9** is driven between up and down positions by small film guide lift drive motor assembly **7**, lift springs **8**, drive motor pulley **10**, cam **11**, and belt **12**. The small film guide could also be driven up by a solenoid or other device.

Operation of device **120** in apparatus **100** is as follows:

For a large sheet of film: The sheet is directed towards a fixed guide **2** and the skew roller **1** is rotated via means of a motor assembly **3**. The film is pushed towards and into the edge guide **2** and then slides along the edge guide towards the imaging nip **5**, **6**. As shown in Figs. 2 and 3 the small film guide is in the down position out of the film path.

For a small sheet of film: The lift motor assembly **7** is engaged which rotates a shaft/cam assembly **11**. (Figs. 6A and 6B) The cams on the shaft are located directly under the small film guide **9** and as they are rotated the small film guide **9** moves up above the base plate **34** pushed by the cams **11**. When the

skew roller **1** is engaged it now pushes the film along the small guide edge **9** into the imaging nip **5**, **6**. Figs. 4 and 5 show the small film guide in the up position in the film path and Figs. 7A-7C show film **200** as it moves through device **120** to imaging nip rollers **5**.

After imaging a small film sheet, the device can either be left in position or lowered back into it's home position to allow a large film sheet to be imaged. To lower the small film guide **9** back below the base plate, the lift motor assembly **7** is engaged which rotates a shaft/cam assembly **11**. The cams on the shaft are located directly under the small film guide **9** and as they are rotated the small film guide **9** is pushed below the base plate by the springs **8** as the cam assembly **11** retreats. (Figs. 6A, 6B).

The machine would know what size film sheet is loaded by reading the information on the film cartridge after it is inserted into the machine. It would then correctly position the small edge guide into the up or down position.

Because centering of the film to a known position is constant, a smaller border region on the film print as allowed. Furthermore, the offset can be measured during manufacturing and an offset can be added to the machine electronics to allow no border if desired.

Although a fixed large film guide has been described, it will be understood that a large film guide which is movable into and out of the film path may also be provided. Furthermore, more than two film sizes can be accommodated with the addition of other film guides movable into and out of the film path.

Another embodiment of this device would be to have the skew roller assembly **122** rotate. That is, the drive angle of the roller in regards to the sheet could also be varied as different width sheets are passed through the system. The angle setting would be dependent on what size cartridge is loaded in device **104**. Similarly it reads the information off of the cartridge. The advantage of this would be a smoother rotation of the sheet and push into the nip rollers.

The invention has been described in detail with particular reference to certain preferred embodiments thereof, but it will be understood that variations and modifications can be effected within the spirit and scope of the invention.

PARTS LIST

1	skew roller
2	large film guide
3	skew roller drive motor
4	drive motor assembly
5,6	rollers
7	lift drive motor assembly
8	lift springs
9	small film guide
10	drive motor pulley
11	cam
12	belt
32	film direction
34	base plate
36,38	brackets
100	apparatus
102	housing
104	module
106	optics module
108	film processor module
110	output tray
112	sheet transport path
114	film up position
116	transport rollers
118	position
120	sheet centering device
122	skew roller
124	position
126	imaging position
132,134	positions
136,138	transport rollers
139	position

200 film